Name ..... Index No. .....

232/1
PHYSICS
Paper 1
July/August 2014
Time: 2 Hours

Candidate's Signature .....

Date .....

WESTLANDS FORM 4 JOINT EXAMINATION
Kenya Certificate of Secondary Education

PHYSICS
Paper 1
July/August 2014
Time: 2 Hours

INSTRUCTIONS TO CANDIDATES

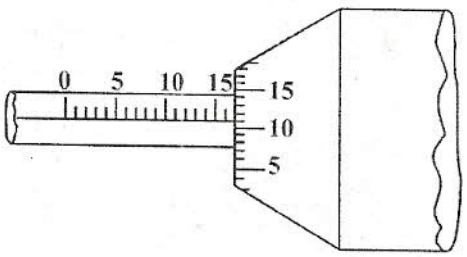
* Write your name and index number and date in the spaces provided above.
* This paper consists of two sections; A and B
* Answer **all** the questions in section A and B in the spaces provided.
* All working **must** be clearly shown.
* Non-programmable silent electronic calculators and KNEC mathematical tables may be used.

For Examiner's Use Only

Section	Question	Maximum score	Candidate's score
A	1 - 13		
B	14		
	15		
	16		
	17		
Total		80	

SECTION A : (25 Marks)

1. The micrometer screw gauge shown in the figure below was found to have a zero error of -0.06mm. Determine the actual reading. (2 marks)



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2. State two factors that determine the moment of a force. (2 marks)

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3. Jane closed a tin with a lid when the tine had steam. She realised that it was not easy to open the lid when the tin had cooled. Explain. (2 marks)

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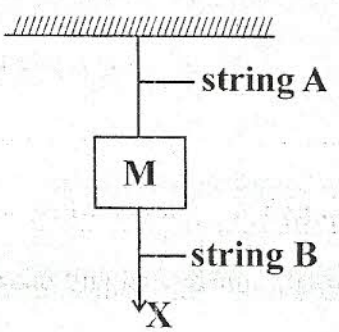
4. Two identical strings A and B are attached to a mass M as shown in the figure below.



If the string B is suddenly pulled downwards from point X, state and explain which string is likely to break first. (2 marks)

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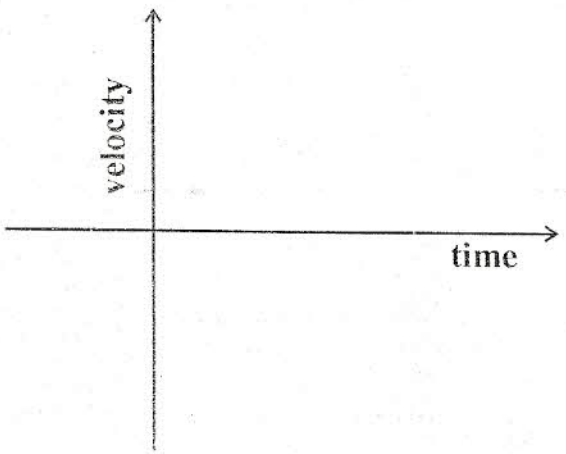
5. An empty density bottle has a mass of 2g. When filled with water, its mass was 5g and when filled with liquid L the mass was 7g. Find the relative density of L. (2 marks)

6. An object is thrown vertically upwards. On the axis below, sketch a graph of velocity against time for the object from the time the object was released to the time it touches the ground assuming no air resistance. (2 marks)



7. State a change you would make in constructing a mercury thermometer so that it can measure smaller changes of temperature. (1 mark)

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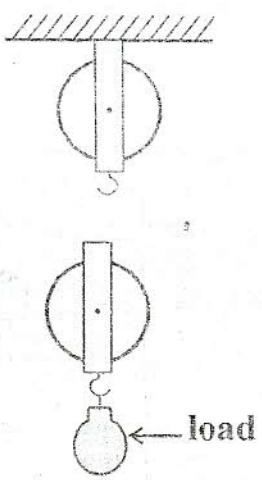
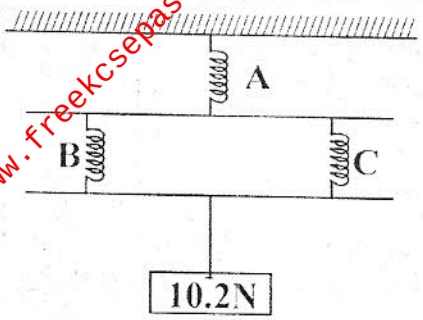
8. The figure drawn below shows part of incomplete pulley system. Complete the diagram for the pulley system of velocity ratio 2. (1 mark)

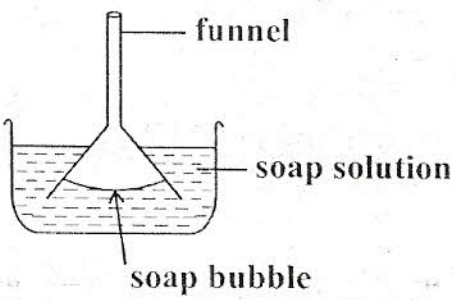


9. Three light identical spring balances A, B and C are arranged as shown below. A weight of 10.2N is supported by the arrangement. What is the reading of the spring balances A and B. (2 marks)



10. A body has 16 joules of kinetic energy. What would be its kinetic energy if its velocity is doubled. (3 marks)

11. Figure below shows a funnel dipped into a liquid soap solution.



Explain what happens to the soap bubble when the funnel is removed. (2 marks)

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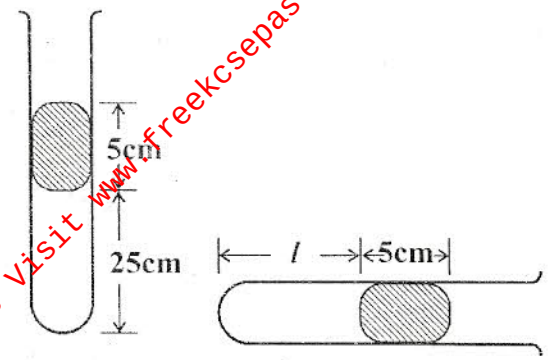
12. A column of air 25cm long is trapped by mercury thread 5cm long as shown in the figure below. When the tube is laid horizontally as in (b) the air column now changes.



If the atmospheric pressure in that place is 100000N/m^2 and the density of mercury is 13.6g/cm^3. Calculate the new length, l, of the air column when the tube is in the horizontal position. (3 marks)

13. Explain how surface tension of water may be increased. (1 mark)

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SECTION B : (55 Marks)

14. a) A man standing on a railway station platform at the front of a train of length 200m. The train starts from rest and accelerates uniformly. After 20 seconds the rear of the train passes the man. Find:

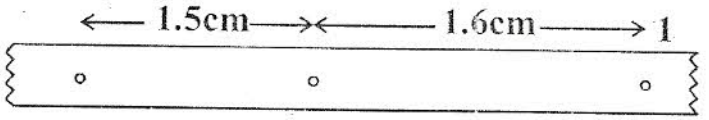
i) the acceleration of the train (2 marks)

ii) the speed of the train after the 20 seconds (2 marks)

b) i) The figure below shows a ticker-tape representing the motion of a trolley of mass 2kg.

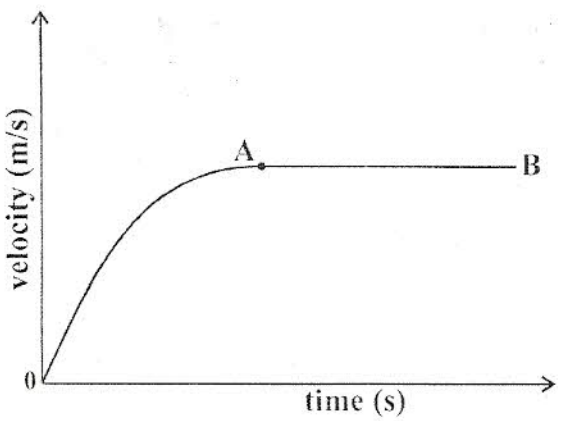
Given that the ticker a frequency of 50Hz, determine the acceleration of the trolley. (3 marks)

ii) The trolley is then loaded with a mass M and the resulting motion is as shown in the ticker tape below.



Assuming that the accelerating force remains constant, determine the mass m. (4 marks)

c) The figure below is a sketch of the velocity-time for a steel ball falling through a column of some viscous liquid.



i) State two constant forces acting on the steel ball. (2 marks)

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ii) Define the term terminal velocity (Vt) and indicate its position on the diagram above. (2 marks)

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iii) Write down the equation relating forces acting on the ball, mass of the ball and its acceleration between O and A. (1 mark)

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15. a) State the Archimedes principle. (1 mark)

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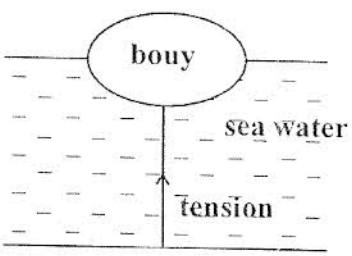
b) A rectangular block of metal has the dimensions 10cm x 4cm x 5cm and has a mass of 1.2kg. The block is suspended from a spring balance while completely immersed in a liquid of density $0.8g/cm^3$.

i) Determine the reading of the spring balance in Newtons. (4 marks)

c) The figure below shows a bouy of volume 40 litres and mass 10kg. It is held in position in sea water of $1.04g/cm^3$ by a light cable fixed to the bottom so that $^3/_4$ of the volume of the bouy is below the surface of water.



Determine the tension. (3 marks)

d) A rod of wood weighed to float upright has a mass of 5g and a uniform cross-section area of $0.4cm^2$. Calculate the length of the rod immersed when it floats in water of density $1.03g/cm^3$

(3 marks)

e) A balloon used to carry instruments for meteorological department up into the atmosphere has a capacity of $30m^3$ and is filled with hydrogen. If the weight of the fabric of the balloon is 300N, determine the maximum weight of the instrument it can carry given the density of hydrogen is $0.089kg/m^3$ density of air is $1.29kg/m^3$ and g = 10N/kg. (3 marks)

16. a) Define angular displacement and state its SI unit. (2 marks)

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b) A string of negligible mass has a bucket tied to its end. The string is 60cm long and the bucket has a mass of 45g. The bucket is made to swing horizontally making 6 revolutions per second. Calculate :

i) The angular velocity (1 mark)

ii) The angular acceleration (2 marks)

iii)The tension in the string (2 marks)

iv)The linear velocity (2 marks)

c) Define centripetal force. (1 mark)

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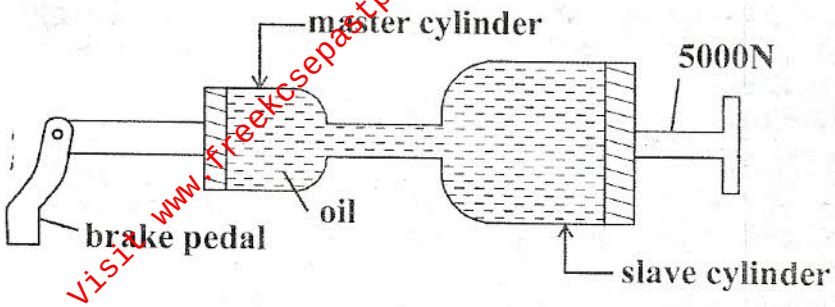
d) Sketch a graph to show how centripetal force vary with :

i) the square of angular velocity (1 mark)

ii) radius of the circle (1 mark)

iii)the square of linear velocity (1 mark)

17. a) The figure below represents an hydraulic brake system.



A force of 20N is applied on the foot pedal connected to a piston of area $0.005m^2$ and this causes a stopping force of 5000N.
Determine :

i) area of the slave piston (2 marks)

ii) efficiency of the system (3 marks)

b) i) Define specific latent heat of vaporisation. (1 mark)

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ii) In an experiment to determine the specific latent heat of water, steam at 100^0C was passed into water contained in a well lagged copper calorimeter. The following measurements were made :
Mass of calorimeter = 50g
Initial mass of water = 70g
Initial room temperature of water = 15^0C
Final temperature of mixture = 45^0C
Final mass of water + calorimeter + condensed steam = 150g
Specific heat capacity of water = $4200 Jkg^{-1}k^{-1}$
Specific heat capacity of copper = $390 Jkg^{-1}k^{-1}$

Determine the specific latent heat of vaporisation of steam, L_v (6 marks)